

Revealing the continental shelf off New South Wales

Cross-agency work increases understanding of tsunami hazard and risk

Kriton Glenn

The results of a 15-day marine survey off the New South Wales coast have provided a regional understanding of the morphology and mass wasting history of the continental slope between Jervis Bay and Forster (figure 1).

While providing a view of previously unknown submarine rivers, bedrock outcrops and multiple deepwater canyons, the survey gathered baseline data that helped Geoscience Australia assess the probability and implications of localised submarine mass failures or underwater landslides.

Harnessing expertise from several areas across Geoscience Australia as well as university specialists, the survey team assessed the continental slope, particularly in areas where it is thought that submarine mass failures could generate tsunamis. The data were presented and discussed at the recent international Submarine Mass Movements and their Consequence Symposium in Greece.

The physiography of the east Australian margin is largely controlled by the original shape of the basement. The survey data reveal that the New South Wales continental slope, despite being characterised by

a very slow sedimentation rate, has been prone to extensive sediment mass wasting over time.

New features discovered

Many remarkable features were also seen for the first time, such as mid slope channels off the Hunter region. Some of these channels have levees and a V shaped morphology, suggesting that both active erosion and deposition are taking place.

Additionally, a series of large pockmarks (~600 metres in diameter and ~70 metres deep) were found in water depths exceeding 1300 metres. The ages of the pockmarks are hard to determine, as they are formed as a result of an ongoing gas or liquid escape from much deeper in the geological profile. Seismic data indicate that the fluid is migrating along faults and escaping via these features into the water column. The profiles show little infilling of the steep walls of the pockmarks, indicating an active erosional process.

Submarine landslides revealed

The swath bathymetry also revealed the slope failure

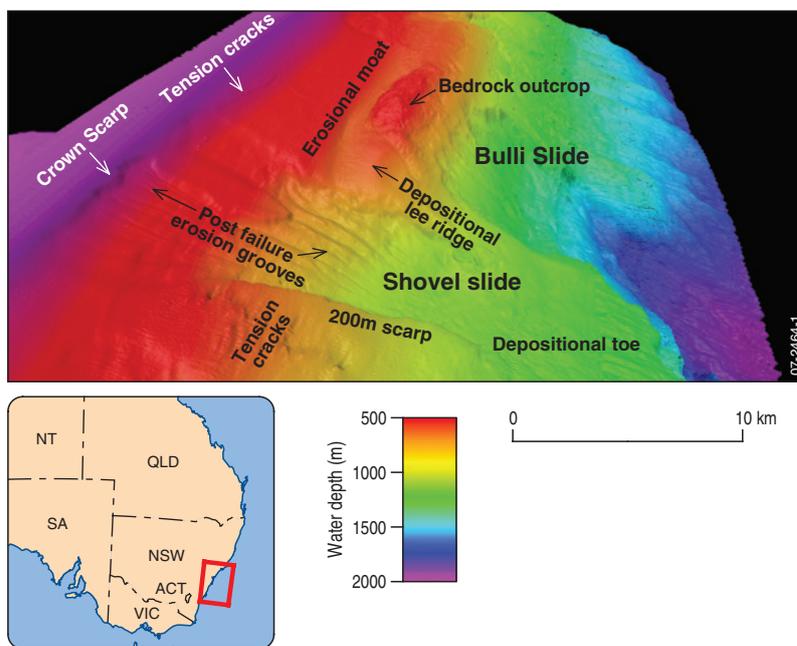


Figure 1. The slope failure architecture and slip-plane geometry of the Shovel Slide. Inset: the survey area off the New South Wales coast.



architecture and slip plane geometry of several submarine mass failure sites. The sites that have failed include the Bulli (~20 km³), Shovel (~7.97 km³; figure 1), Birubi (~2.3 km³) and Yacaaba (~0.24 km³) slides.

The sub-bottom profiles illustrate the nature of the failures and highlight two distinct types: those related to the sediment bedding planes in the Cainozoic sediment wedge and those related to the critical dynamics of the seaward face of volcanic highs, slope angle and sediment load.

The survey also helped to identify potential failure sites across much of the continental slope. Sites identified as potential failure zones displayed retro-gradational failure and surface cracking, and some are subject to localised slope undercutting. Taking these factors into consideration and assessing the location of vulnerable sediment accumulations, future programs will seek to identify and assess additional areas susceptible to failure along Australia's continental slope.

Predicting tsunami risk

This survey provided essential information for developing models to assess the risk of tsunamis to the Australian coastline. The data were coupled with tsunami model outputs to develop a palaeo-tsunami

investigation program that seeks to determine if and when tsunamis have occurred along the New South Wales coast.

The results of this type of scientific enquiry provide a model for further assessment of tsunami risk along the Australian continent.

For more information

phone Kriton Glenn on
+61 2 6249 9379

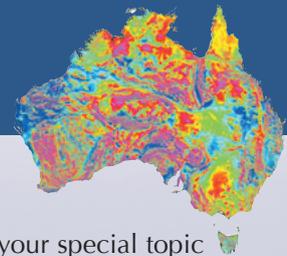
email kriton.glenn@ga.gov.au

Data acquired:

- ~9200 square kilometres swath bathymetry
- 3414 kilometres sub-bottom profiles

AusGeoRef

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